From: Mark Rivers <rivers@cars.uchicago.edu>
Subject: **RE: strange EPICS glitch**
Date: November 10, 2012 7:16:18 PM CST
To: Matt Newville <newville@cars.uchicago.edu>, Brian Toby <brian.toby@anl.gov>
Cc: Andrew Johnson <anj@aps.anl.gov>

The problem here is not the caput, but rather the caget. It happens when using waveform records to hold strings.

asynPortDriver (e.g. areaDetector) has always set NORD to the actual length of the string (i.e. strlen(string)), and not added a trailing NULL.

This worked fine in previous versions of EPICS because a caget (without a length) would always pad the array with zeros, so the caget returned a null terminated string. Similarly monitor callbacks always returned the full array, again padded with zeros. So the string was correctly NULL terminated.

With the new EPICS support for only returning the NORD characters of a waveform, clients need to add the NULL.

This is something that should be clarified soon. If a waveform record contains a string, what should NORD be set to? strlen(string), or strlen(string)+1, and always have a trailing NULL? As far as I know this is not documented anywhere, and the former behavior worked fine in previous versions of EPICS. So should all device support be changed to accommodate the new behavior of EPICS? That would also imply that potentially all EPICS clients would need the change as well, since now NORD would mean something different than it used to mean? Note that Ralph Lange recently changed camonitor -S to add the NULL if it does not exist in NORD.

If the decision is made that NORD should be strlen(string)+1 including a trailing NULL then I can easily do that asyn device support for waveform records. But I will emphasize that it potentially will break some clients, because the meaning of NORD will have changed.

Mark

From: matt.newville@gmail.com [matt.newville@gmail.com] on behalf of Matt Newville [newville@cars.uchicago.edu]
Sent: Saturday, November 10, 2012 6:05 PM
To: Brian Toby
Cc: Mark Rivers; Andrew Johnson
Subject: Re: strange EPICS glitch

Hi Brian,

On Sat, Nov 10, 2012 at 3:18 PM, Brian Toby <brian.toby@anl.gov> wrote:

> Matt,
>
> I came up with an unusual problem with writing a file name to the GE detector today where it would not clear out the old string when writing to a PV. I will try to recreate this here:
>
> GE1:cam1:FileName starts as 'previousname'
> GE1:cam1:FileName_RBV starts as 'previousname'
>
> caput('GE1:cam1:FileName','new')
>
> GE1:cam1:FileName is now 'new'
> GE1:cam1:FileName_RBV is now 'newviousname'
>
> I have not tried this on any other AreaDetectors, but this does not happen in caput from spec. Could it be that the full array needs to be padded with zeros? I plan to do some more work on this on Monday to learn more, but I thought if you have any insight, I'd be glad to hear it.
>
> Brian

I'm not sure if this really is a problem with PyEpics or with the way areaDetector converts one DBR_CHAR waveform record to another. It is definitely related to the relatively new behaviour in which one can send a part of a waveform. So, I'm also sending this to Mark and Andrew, because I'm not sure what the correct behavior should be. It's easy enough to fix (or work around) with PyEpics, and I see no reason to not do that: the attached lib/ca.py (and the github master branch) fixes the problem.

When you do a CA put to a DBR_CHAR waveform of length 256 (typical for areaDetector FileName PVs) with a string 'XXXXX' PyEpics had been sending the array [88, 88, 88, 88, 88] (that is, exactly 5 'X' characters). If you then sent 'AAA', it sent [65, 65, 65]. With that behavior, a command-line caget and other CA clients does report the new value as 'AAA', not 'AAAXX'.

Indeed, you see that GE1:cam1:FileName is 'new'. But the readback PV from areaDetector apparently does not truncate according to the limited size send to the input PV. If PyEpics sends [65, 65, 65, 0], then both the areaDetector cam1:FileName and cam1:FileName_RBV are set to 'AAA'. The attached lib/ca.py makes sure to append a trailing NULL. Again, I don't see any problem doing that, but I don't see why it should be needed.

Apparently, sending the trailing NULL is not needed for the DBR_CHAR record itself but is needed for areaDetector to convert cam1:FileName to cam1:FileName_RBV.

The command-line caput utility also apparently sends a trailing NULL (or perhaps reverts to the older behaviour of filling the waveform with NULLs to its full size), as both :cam1:FileName and :cam1:FileName_RBV are set to the shorter waveform.

I have no problem with changing PyEpics to send a trailing NULL to make this all work more smoothly. But I suspect that areaDetector might show similar problems from other clients.

Cheers,

--Matt